



In Conjunction with the American Chemical Society  
Student Affiliates at the University of Pittsburgh



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September 3, 2004

## THE WELCOME BACK EDITION



*Dear Colleagues: Welcome Back!!!!*

*We hope that your summer adventures took you in many new directions...whether you traveled to new places, prepared for your future career, or just took some much deserved time to decompress and relax.*

*As summer draws to a close, it's now time to head home to Pitt to explore what has changed in Oakland while you've been away, to venture around campus, to finalize your fall semester schedule, and to get back in to the swing of life as a college student.*

*On behalf of the American Chemical Society-Student Affiliates (ACS-SA) chapter at the University of Pittsburgh, we would like to extend our warmest welcome to both returning and new students at Pitt. For those of you who have not traveled with ACS-SA before, we hope that you will consider joining our nationally recognized organization. This year, we have an schedule that should have something to suit everyone's tastes. We'll have many speakers to help guide you in planning your future and possibly show you a few new paths that are open to you. For the thrill seekers in the group, we will be continuing our outreach program—believe us when we say that getting younger students in the Pittsburgh area excited about science is never dull. For those of you who like to take a mini-vacation from academics, please join us for our Halloween Party (complete with pumpkin painting) and other social events.*

*For more complete information about this semester's activities, please check out the back page of this issue of "Chem Major News." Furthermore, we have included an application form that we hope you will fill out and return at our first meeting on Friday September 3, 2004 in Room 132 CHVRN. We'll be having a pizza party so that everyone can catch up with old friends, make some new friends and together begin a new semester. We hope that during this year, we can continue to have lots of member involvement in our many activities. Also, please be sure to explore our website at: <http://www.pitt.edu/~chemdept/acs-sa/index.html> to find out more information about our group.*

*So once again, we'd like to welcome you all back to Pitt and wish you luck as you journey into another semester. We hope that you'll include ACS-SA in your plans and we hope to see you all in Chevron 132 at noon on Friday, September 3, 2004 for a pizza party to kick off another great year!*

*Sincerely, ACS-SA Officers and Staff*

### 2004-2005 ACS-SA Officers and Staff

**Sarah Bell**-Co-President  
**Joan Fletcher**-Co-President  
**Chris LaRocca**-Vice President  
**Lilly Roy**-Secretary  
**Aaron Kessler**-Treasurer



**Justin Chalker**-Outreach Coordinator  
**Derek Miller**-Newsletter Editor  
**Christina Pampena**-Student Affairs  
**Michelle Morgan**-Senior Affairs  
**David Schoppy**-Chemistry Day Chair

**Josh Pierce**-Web Design

CHEM MAJOR NEWS



This year we are adding a new page to the newsletter where you can win various prizes. Each month we are going to ask 10 questions, some difficult and some easy. The prizes will vary monthly and may include movie tickets and gift certificates. Please drop off the completed answer sheet at any ACS meeting prior to the last meeting of the month. The winner will be announced at the last meeting of each month.

Thanks, and Good Luck! Derek Miller, *Co-Editor*



## SEPTEMBER 2004 QUESTIONS

1. Who is the President of the ACS?
2. Who discovered potassium and sodium?
3. Where is the Undergraduate Chemistry Program Office located?
4. How many N atoms are in  $2.05 \times 10^{22}$   $N_2O$  molecules?
5. Who is the ACS mascot?
6. What is lindane?
7. Who is Dr. George C. Bandik?
8. Who is the Vice-President of the ACS?
- 9./10. Name two ways that you can get involved in the ACS.



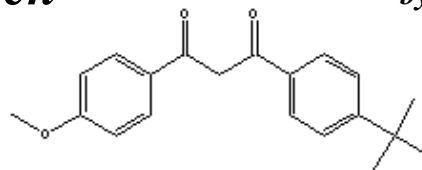
Name: \_\_\_\_\_ Email: \_\_\_\_\_

### *Answers to September 2004 Chem Major News Questions:*

- |          |           |
|----------|-----------|
| 1. _____ | 6. _____  |
| 2. _____ | 7. _____  |
| 3. _____ | 8. _____  |
| 4. _____ | 9. _____  |
| 5. _____ | 10. _____ |

# *My friend 4-tert-Butyl-4'-methoxy-dibenzoylmethane: The Photochemistry of Sunscreen*

by: Derek Miller



## My tale of woe

For those of you who do not know me, I had red hair when I was a child, I have very fair skin, and I have blue eyes and freckles. (And no, this is not an article that should be put in the singles column of the newspaper. Suffice it to say, I get sunburned very easily. The mere mention of the beach and my skin gets burned. It does not help that I live 2 minutes from the ocean and beaches in southern Rhode Island. It took me twenty years to finally call 4-tert-Butyl-4'-methoxy-dibenzoylmethane my friend or Avobenzone as he is know by his best of friends. What is the reason you ask, why I had this change of heart? It all started with a nice day at the beach. My back, quite honestly, had not seen sun in twenty years. I wanted to impress my future girlfriend and not look stupid wearing a shirt into the water so I took it off at 10 in the A.M. Too embarrassed to ask for help to apply sunscreen to my snow white back I covered as much a I could.

Here is a recipe for pain:

1 fair skinned human with reddish hair and freckles;

1 blistering hot summer day with blue sky and unlimited visibility;

**Directions:** Remove all common sense and apply no sunscreen. Bake in the sun for 6-8 hours or until back is blistered and covered with second degree burns. Remove from sun and listen to the whining and complaining for 1 1/2 to 2 months. Enjoy!



## UVA and UVB rays

When one steps outside they are unknowingly barraged with a mixture of UVA and UVB rays from the sun. UVA rays are long-wave ultraviolet rays between 320 and 400 nm and are not absorbed by the ozone. They penetrate the skin and are responsible for the effects of premature aging and photoaging. On the other hand, UVB rays are short-wave ultraviolet rays between 290 and 320 nm and are partially absorbed by the ozone. They impact only the surface of the derma and are the primary cause of sunburn and skin cancers. A sunscreen is a product that chemically absorbs or physically reflects ultraviolet rays thereby leaving the skin unscathed.

## Ingredients in sunscreen

Sunscreen's lot in life is to protect the skin of those who use it. To do this, it employs two methods: absorption and reflection. Sunscreen uses chemical ingredients such as avobenzone and other benzophenones to absorb UVA rays and titanium dioxide and zinc oxide to physically reflect UV rays.

## What's this SPF deal anyway?

SPF or Sun Protection Factor is a rating given to sunscreen to determine its effectiveness at preventing sunburn and sun damage to the skin. It is "calculated by comparing the amount of time needed to produce a sun burn on sunscreen protected skin to the amount of time needed to cause a sun burn on unprotected skin." [www.aad.org] For example, an SPF of 15 means that a person could wear the sunscreen for 150 minutes and get the same sunburn as a person wearing no sunscreen in 10 minutes. An SPF of 15, which is the recommended minimum for sun protection blocks out 93% of UV rays and a SPF of 30 blocks out 97%. From this we can deduce that doubling the SPF does not mean doubling the blockage.

## Round and Round we go

Molecules have a wide ability to absorb light and energy and they also have a diverse ability of dealing with that absorbed energy once they absorb it. Some molecules in the excited state will:

- emit a photon and return to the ground state
- return to the ground state by emitting thermal energy
- undergo some type of reaction
- or the molecule itself can convert to a lower state of energy. [www.chm.bris.qc.uk]

Avobenzone, a aromatic molecule with delocalized Pi electronic systems is used in sunscreen along with other molecules because they absorb the UV rays in a harmless matter. Most will go through “vibrational relaxation” which is a series of rapid vibrational transitions until they return to their ground state. Once they reach the ground state, the molecule can start the cycle all over again and absorb another UV ray. [www.sas.upenn.edu/~mtc/Sunscreen.htm] Avobenzone and other molecules that are ingredients in sunscreen have conjugated Pi systems and delocalized electrons in “organic molecules the chromophores that are responsible for the absorption of UV light” are located there.

## Buy it and Apply it

For the remainder of the summer of 2004, keep your skin safe. It will thank you for years to come. Buy sunscreen and apply sunscreen regularly even on cloudy days because one source says “80 % of UV rays penetrate the clouds”. The EPA gives these 6 guidelines for having a safe and fun time in the sun:

1. Wear sunglasses
2. Seek shade
3. Limit time in the strong, midday sun
4. Wear tightly woven, long sleeve clothing (You don't have to wear a parka but just something that is breathable and covers your arms)
5. Wear a wide brim hat
6. Apply a broad spectrum sunscreen, SPF 15 or higher

With these guidelines and this knowledge, you are all set to enjoy what little remains of summer. Have fun!

## Sources

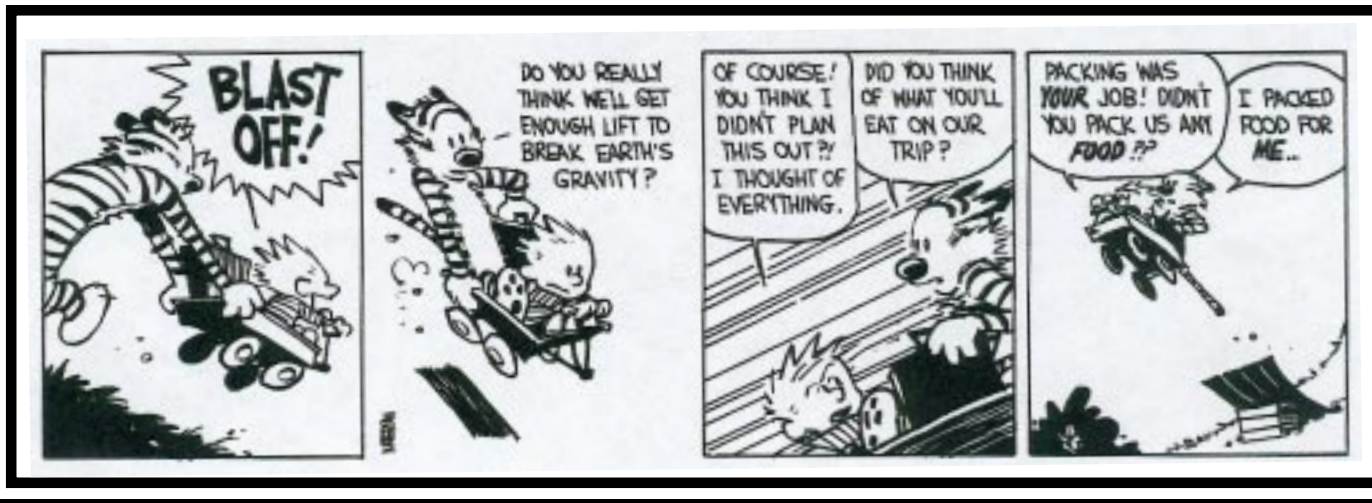
[www.epa.gov/sunwise](http://www.epa.gov/sunwise)

[www.aad.org](http://www.aad.org)

[www.chm.bris.qc.uk](http://www.chm.bris.qc.uk)

[www.sas.upenn.edu/~mtc/sunscreen.htm](http://www.sas.upenn.edu/~mtc/sunscreen.htm)

## ACS-SA Comedy Corner



# Tentative ACS Fall Schedule

- September**
- 03 Welcome Meeting with Pizza
  - 10 Surface Science at Temple University  
*Professor Eric Borguet, Temple University*
  - 17 So You Need a Job?  
*Ms. Tricia Hilliard, University Placement Services*
  - 24 Getting Ready for Graduate School  
*Professor Tara Meyer, Chemistry Department*
- October**
- 01 The Preprofessional Timeline  
*Ms. Jenn Cwiklinkski, Preprofessional Advising Office*
  - 08 Preparing for National Chemistry Week 2004  
*"Health and Wellness" with Justin*
  - 15 Registration Time and Fall Birthday Celebration with George
  - 22 Halloween Extravaganza with Pumpkin Painting  
on the Front Patio
  - 29 Green Chemistry at Sunoco  
*Dr. Jeff Salek*
- November**
- 05 How to Get a Job at Pitt  
*Donna DiLeonardo, Department of Human Resources*
  - 12 Analytical Chemistry at Pitt  
*Professor Sunil Saxena*
  - 19 Fall Term Awards Ceremony
  - 26 Happy Thanksgiving  
NO MEETING
- December**
- 03 Preparing for Saturday Science  
*This year Saturday Science will be held on December 4, 2004*
  - 10 Good Luck with Finals!  
NO MEETING



## *This Past Summer*

*By: Derek Miller*

*This is the first in a monthly series of articles where you, our readers, are able to share your scientific endeavors with us. As co-editor of the Chem Major News this year, I am pleased to be the first contributor to what we hope will be an interesting and popular series.*

This past summer, I had the opportunity to work for Dr. Ian Reynolds in the School of Medicine's Department of Pharmacology. The laboratory focuses on "studying the contributions of mitochondria to neuronal injury, and are investigating the participation of mitochondria in calcium homeostasis and in free radical production".

It is a well known fact that mitochondria utilize oxygen to produce ATP. What is not well known is the rate of oxygen consumption of the mitochondria and what affects certain pharmacological agents have on them. The goal of this project is to determine this rate by using a dopanergic-like cell line incubated at high oxygen (20%) and low oxygen (5%) levels and to determine whether or not there is a difference.

Right now, the results show that there most certainly is a difference between the high and the low oxygen incubated cells but to put a definitive number on the difference is not yet possible. There are a few hypothesis that we are tossing around. One is that the low oxygen cells may have some type of gene up regulation in order to be able to produce enough ATP. When they are in a high oxygen atmosphere, they keep respiring at that rate, which is higher than the 20% cells, because they do not have to work hard to produce the same amount of ATP, they are saturated with oxygen.

This is important because the brain has an oxygen level of roughly 5% or what we are calling low oxygen while most experiments that are conducted to mimic brain cells use cells incubated at high or 20% oxygen. If the cells incubated at 5% turn out to have a different rate, then it can be inferred that experiments using cells incubated at 20% may not accurately represent the actual brain cells.

The ACS-SA will be selling hoagies every Tuesday at lunchtime in the lobby of Chevron Science Center. This year they will be from Uncle Sam's! Details to follow soon....

